1928

# NOTES ON ARCTIC UREDINALES


J. C. Arthur

Reprinted from Mycologia, Vol. XX, No. 1, January-February, 1928.

[Reprinted from MYCOLOGIA, Vol. XX., No. 1, January–February, 1928.]

# NOTES ON ARCTIC UREDINALES[1]

J. C. ARTHUR

The plants brought back from northwestern Greenland in the Danish Jubilee Expedition of 1920–23 have been critically searched for micromycetes by Mr. J. Lind, resulting in the detection of 80 species, 5 of them being Uredinales. Mr. Lind has made his report in No. 2 of the account of the expedition (1926) and takes occasion to revise some of the taxonomy involved. As to the rusts it is only required to state here that the writer agrees entirely with the conclusions, except in the case of *Puccinia Thlaspeos*, which he believes to be quite distinct from *P. Holboellii*. The characters of the two species are given in volume 7, page 532, of the North American Flora, a publication, by the way, that is not mentioned in the literature cited.

In a later work, "The Geographical Distribution of Some Arctic Micromycetes," 1927, Mr. Lind has made a highly important contribution to the subject of plant dissemination in high northern latitudes. He points out that the strong wind of the region may carry seeds, fragments of stems and leaves for long distances over the surface of snow and ice, often depositing them in crevices or valleys where conditions are favorable for growth upon return of warm weather. For nine months of the year ice bridges the waters between islands and even the continents, so that the winds may sweep parts of flowering plants with the endophytes living upon them over a smooth dry surface in a circumpolar migration, even over such long stretches as between Greenland, Norway, Nova Zembla and Spitzbergen. This deduction is supported by citations from the writings of a number of arctic travelers. In all probability the agency of the wind is the chief, if not the only, agency for the dispersal of plants and their parasites in arctic regions, a conclusion which seems logical.

It is also pointed out that the most common arctic rusts are short-cycle species, like *Puccinia Arenariae*, *P. Holboellii*, *P.*

[1] Contribution from the Department of Botany, Purdue University Agricultural Experiment Station.

*Drabae* (*P. Cochleariae*), *P. Cruciferarum* (*P. Cardamines-bellidifoliae*), which are readily distributed in connection with their hosts. Nine such species are known from near the arctic circle in North America.

The author's statement regarding heteroecious species, however, requires emendation. He says, "If heteroecious species of rusts were found in arctic regions, or other species of fungi the nature of which demanded that spores from one host-plant should be transferred to another in order to thrive, it would be a proof against my theory that the endophytes are spread together with their hosts in arctic countries." This statement carries the inference that heteroecious rusts require two unlike hosts in order to thrive, which is only true for a comparatively few species, for many of them can be spread and maintained indefinitely by their urediniospores.

To account for the presence of *Melampsora arctica*, which occurs on both *Salix* and *Saxifraga*, and is one of the most abundant of arctic rusts, the author assumes that portions of infected *Saxifraga*, the mycelium being perennial, will carry the rust, and upon taking root again can spread fresh spores to the willows in the vicinity. It is equally conceivable, however, that the uredinial mycelium in the willow stems may survive the winter and spread the rust directly to other willows. That method of propagation is known to be common with *Melampsora Bigelowii* in the Rocky Mountains and elsewhere.

But neither of these methods will account for the abundance in arctic regions of the heteroecious *Puccinia Polygoni-vivipari*, which has no perennial mycelium in either alternate host. The aecia which occur on *Ligusticum* have not been found as far north as the uredinia and telia. The latter were taken on Cockburn Island, far north of the arctic circle. Probably the rust is scattered by its urediniospores, which are abundant and could easily be distributed by the wind along with the seeds and dried stems of the host.

Another rust of a still different character is the autoecious *Uromyces carnea* (*Aecidium Phacae-frigidae*) which has been collected in the aecial form near the mouth of the Mackenzie River, far north of the arctic circle. The aecia arise from a

perennial mycelium, the telia are only slightly pulverulent and are not accompanied by uredinia. In this case the distribution is doubtless by means of wind, carrying the teliospores along with fragments of the plant until lodged against other plants which can be infected when new growth begins. It is improbable that the aecia play the part in distribution that they do in the willow rust, as the branches of *Phaca* can scarcely retain their vitality and start new growth as can readily be done with *Saxifraga*.

There are nine species of long-cycle rusts known from near the arctic circle in North America, the same number as of short-cycle rusts, but with the exception of *Melampsora arctica* they are not so abundant or on so many species of hosts. All of the nine species are heteroecious except two, *Uromyces carnea* and *Trachyspora Alchemillae*. In reviewing the possibilities for distribution of these long-cycle forms there seems to be no doubt that they conform in general to the same method as the short-cycle forms and are dependent upon the wind for long distance migrations.

PURDUE UNIVERSITY,
LAFAYETTE, INDIANA

LANCASTER PRESS, INC.
LANCASTER, PA.